



Viz

A tool for immersive visualization of remote environments. Viz allows mission operations teams on earth to construct 3-D models of a remote environment from 2-D stereoscopic images to support robotic operations and maintenance tasks.

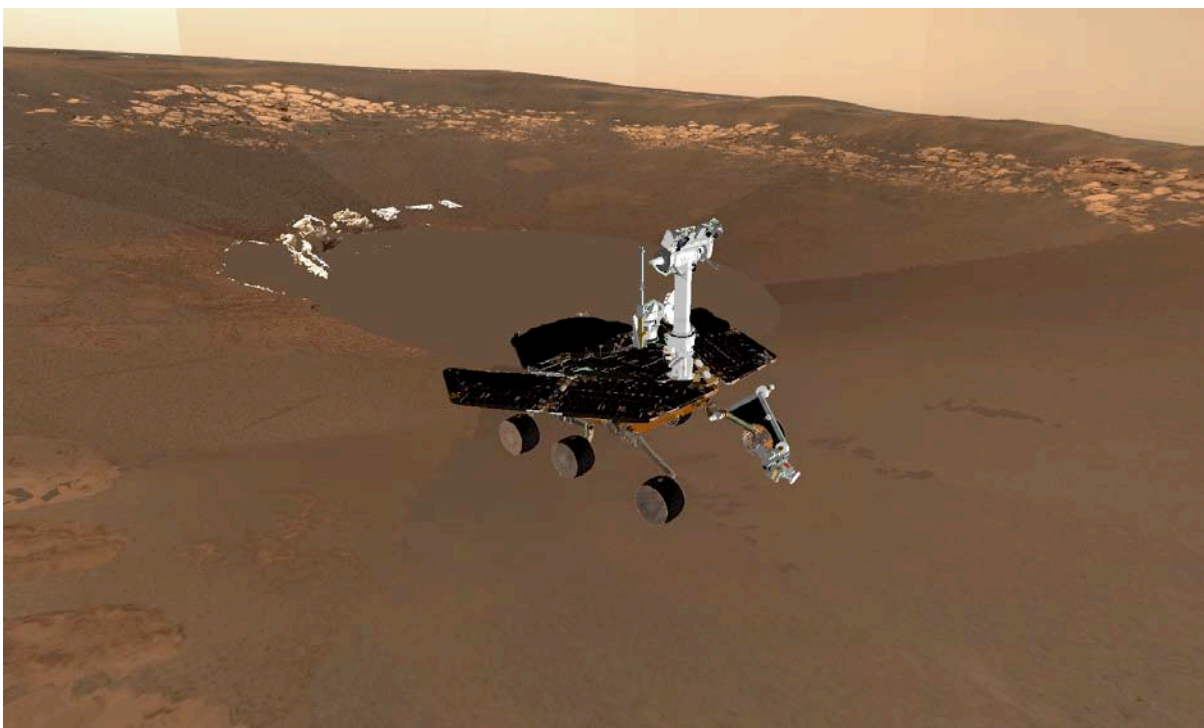
Background

One of the toughest challenges for mission teams conducting remote operations with robots during a planetary exploration mission is the visualization of a robot's position on the planet relative to the objects in its environment. Viz provides the mission team with a 3-D model of the remote environment and the ability to simulate robot operations in its virtual 3-D world using an accurate kinematic simulator before issuing commands to the "real" robot. Viz was used throughout the Mars Exploration Rover (MER) Mission to put teams working at mission control in Pasadena into the virtual Martian environment.

Research Overview

With a keyboard and mouse teams could drive the rover across the reconstructed Martian surface to interactively explore and plan activities. With Viz the teams could:

- pick science targets
 - select the safest, most efficient path toward the targets
 - measure rock surface areas
 - measure distances between rocks
- Viz provides the ability to pour virtual water onto the topographical information so that scientists could hypothesize what natural forces, such as ancient water or lava flow, might have shaped the planet.



Viz: Immersive Visualization

Viz is able to predict when and where on the Moon or Mars the sun will cast shadows on a rover and land surfaces, enabling mission planners to capture good images and other data. Mission planners can use Viz to pan and tilt a rover's camera to preview an image before sending the real rover over to take a shot. Viz supports network communications so that two or more people can communicate through Viz. In addition to supporting NASA's exploration initiative, the team that created Viz plans to play a role in the next Mars rover mission, the 2009 Mars Science Laboratory (MSL), which calls for onboard autonomy and remote operations.

Relevance to Exploration Systems

Viz provides a framework for remote users to perform inspection, maintenance and assembly tasks efficiently and inexpensively. Its virtual world also allows complex tasks to be debugged and refined in simulation before they're performed on real hardware.

H&RT Program Elements:

This research capability supports the following H&RT program elements:

ASTP/Software, Intelligent Systems & Modeling

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